IOP Conference Series: Earth and Environmental Science 2016 vol.33 N1

Development of a permanent geological environment model of Kazan city aimed to solve various engineering-geological problems (Russia)

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Abstract

© Published under licence by IOP Publishing Ltd.The article discusses the composition, structure and operation principles of a digital geological environment model for the urban area located in the valley of a large lowland river (the Volga). The model is implemented in ESRI (ArcView and ArcGis) and MapInfo software environments. The basis of the model is the data on the composition and physical and mechanical properties of soils, the information about ground waters and industrial loads. The model has been used to conduct zoning of soil conditions, groundwater aggressivity to the materials of underground structures. Also, the areas of existing and possible exogenous geological processes (flooding, karst, suffusion, erosion, landslides) have been identified. According to the model, it is offered to evaluate the stability of geological environment to human impact using typification on the soil conditions based on the pre-zoning of water content and the degree of drainage. A new monitoring system of dangerous exogenous geological processes has been developed, the impact of exogenous processes on the residential buildings has been estimated, and, also, the analysis and evaluation of geological risks have been performed. According to the data on the composition, density and water saturation of soils, the stability of the ground bases to a dynamic impact has been estimated.

http://dx.doi.org/10.1088/1755-1315/33/1/012048